

U.S. Census Bureau: Community Resilience Estimates

May 7th, 2021

R. Chase Sawyer

Small Area Estimation Program
Social, Economic, and Housing Statistics Division
United States Census Bureau



About the U.S. Census Bureau

- The U.S. Census Bureau is the federal government's largest statistical agency.
- We conduct more than 100 censuses and surveys each year, including
 - **The Decennial Census** – the once-a-decade population and housing count of all 50 states and U.S. territories
 - **The American Community Survey** – the ongoing, annual survey of the social, economic, housing, and demographic characteristics of the nation's population
 - **The Economic Census** – the official five-year measure of American businesses
- Our mission is to serve as the nation's leading provider of quality data about its people and economy.



Census Bureau as a Data Steward

- We are data stewards who:
 - Compile and standardize data
 - Research new and innovative means of collecting and presenting data
 - Create estimates that inform business, policy makers, and government agencies
- Examples of this include:
 - SAIPE and SAHIE
 - Planning Database
 - Community Resilience Estimates



Presentation Outline

- ✓ About the U.S. Census Bureau
 - What is resilience and what measures currently exist?
 - Why should the Census Bureau measure resilience?
 - Community Resilience Estimates
 - Where do we go from here?

What is Resilience?

- Community resilience is a measure of the capacity of individuals and households within a community to absorb, endure and recover from the external stresses of the impacts of a disaster.
- Research shows that resilience can be predicted by individual and household characteristics.

Social Vulnerability Index (SoVI)

- Susan Cutter, University of South Carolina (2003)
- Popular and inspired lots of future work
- Constructed using over two dozen variables; the specific formulation varies over time and application.
- ACS 5-year County level

SoVi Limitations

- Appropriate measurement error missing
- Unstable low-level estimates, especially for small places
- County level indices
- Timeliness
- Speilman et al.:
 - show that multiple SoVI-based measurements of the vulnerability of the same place, using the same data, yield strikingly different results.
 - notice that SoVI is often misaligned with theory; increases in variables that contribute to vulnerability, like the unemployment rate, often decrease vulnerability as measured by the SoVI.
 - caution against the use of the index in risk-reduction efforts.

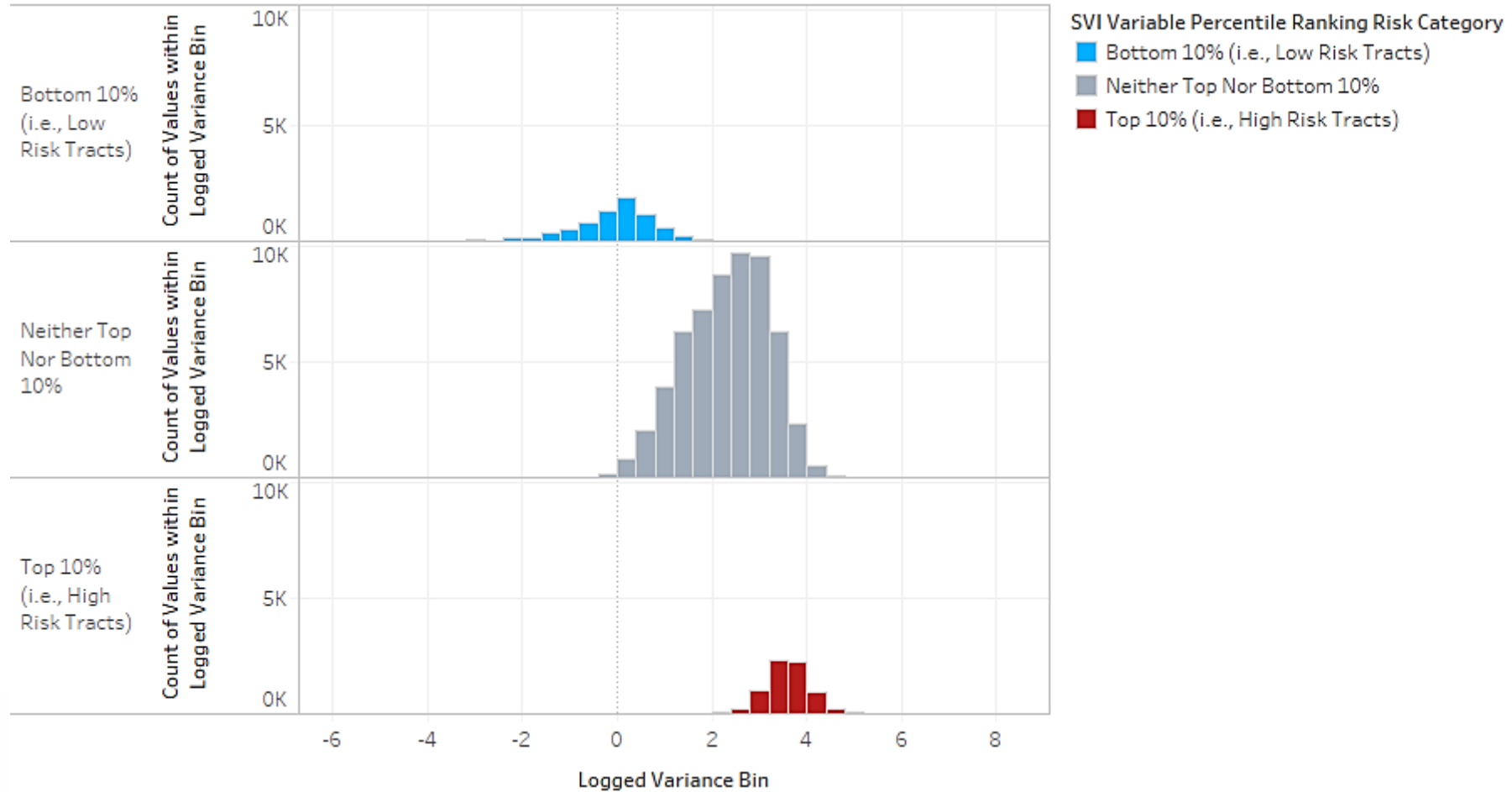
Social Vulnerability Index (SVI)

- Centers for Disease Control and Prevention
- Identifies vulnerable areas for disaster planning and response.
- Uses 15 ACS variables organized into four dimensions: socioeconomic status, household composition, minority status and language, and housing type and transportation.
- The indicators are are normalized and summed to create the index.
- ACS 5-year estimates

SVI Limitations

- Appropriate measurement error missing
- Unstable low-level estimates, especially for small places
- Rankings are not statistically tested for differences
- Timeliness

SVI Variances



Why should Census measure resilience?

- All measures of population resilience / risk / vulnerability use publicly available Decennial Census and / or American Community Survey data.
 - Currently available measures are deficient in granularity and accuracy.
- Using ACS restricted microdata retains correlation of individual risks.
 - Ideal for identifying most vulnerable populations to ensure equitable distribution.
 - Unavailable to the public.

The Census Bureau's Capability

- The Census Bureau serves as the nation's leading provider of quality data about its people and economy.
 - This makes the Bureau well positioned to provide the most accurate and timely measures for an individually focused community resilience indicator.
- We can adapt the estimates as needed to incorporate the latest and most relevant data.
- Invite collaboration with academics and federal agencies.

Established SAE Programs at the Census Bureau

Small Area Income and Poverty Estimates (SAIPE) Program

- US Department of Education sponsors SAIPE.
- Uses SAIPE child poverty data as the main input to allocate approximately \$15 billion in federal funds as prescribed by Every Student Succeeds Act (ESSA).

Small Area Health Insurance Estimates (SAHIE) Program

- Centers for Disease Control and Prevention's (CDC) National Breast and Cervical Cancer Early Detection Program (NBCCEDP) co-sponsors SAHIE.
- SAHIE uninsured data used to assess the eligible population of low-income, uninsured women for cancer screening and diagnostic services as mandated by federal legislation.
 - Breast and Cervical Cancer Mortality Prevention Act of 1990
 - Breast and Cervical Cancer Prevention and Treatment Act of 1999
 - Patient Protection and Affordable Care Act 2010

The Need for the Community Resilience Estimates

- COVID-19 pandemic presented the need for timely, accurate, and customizable information about the population.
- Many groups reached out to the Census Bureau for data.
- CRE is a culmination of research from the literature and prior programs work (SoVI and SVI).

Individual Risk Flags

ACS Risk Flags:

- Aged 65 and above.
- In households with an Income-to-Poverty Ratio less than 130.
- Living in single, or zero, caregiver households.
- Living in households with a communication barrier (education and language).
- Who live in a household with no employed persons.
- With either physical or mental disability or serious constraint to significant life activity.
- Living in a household with more than 0.75 persons per room.
 - Or who live in a tract where more than 75% of the population reside in a block denser than 4,000 people per square mile.

NHIS Risk Flags:

- Respiratory Disease
- Heart Disease
- Diabetes

Community Resilience Estimates

- The result is an estimate of the number of individuals by the number of risk factors they are living with, categorized into three groups:
 - Zero flagged risk factors
 - One to two flagged risk factors
 - Three or more risk factors.
 - The most vulnerable of the vulnerable.

CRE Releases

- June 2020
 - Released first iteration using 2018 ACS data
- April 2021 (Tentatively)
 - Planning to release iteration using 2019 ACS data



Ways to Access the Data

- [Community Resilience Estimates Dashboard](#)
- CSV file download
- Reach out to our staff



Community resilience is the capacity of individuals and households to absorb, endure, and recover from the health, social, and economic impacts of a disaster such as a hurricane or pandemic.

When disasters occur, recovery depends on the community's ability to withstand the effects of the event. In order to facilitate disaster preparedness, the Census Bureau has developed new small area estimates, identifying communities where resources and information may effectively mitigate the impact of disasters.

Variation in individual and household characteristics are determining factors in the differential impact of a disaster. Some groups are less likely to have the capacity and resources to overcome the obstacles presented during a hazardous event. Resilience estimates can aid stakeholders and public health officials in modeling these differential impacts and developing plans to reduce a disaster's potential effects.

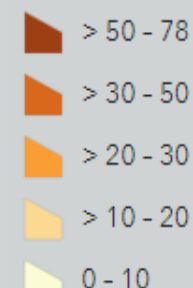
Individual and household characteristics from the 2018 American Community Survey (ACS) were modeled, in combination with publicly-available data from the 2018 National Health Interview Survey (NHIS), to provide tract and county level estimates.

More information on Census Bureau

Thematic Risk Factor (RF) based on the risk factor selected above

Thematic Risk Factor
(Counties)

Percentage of Residents



Esri, FAO, NOAA

Thematic Risk map

Predominant Risk map

Thematic Risk w/Pop map

COVID-19 Impact Report

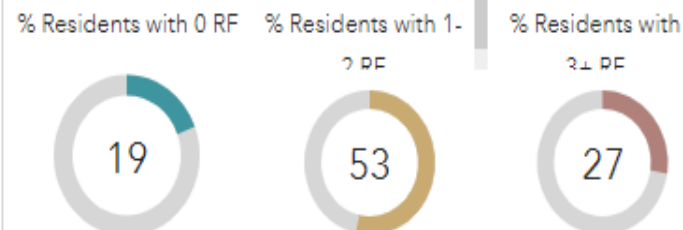
State Profile (based on county average)



Percentage of Residents

Number of Residents

County Profile (based on tract average)



Percentage of Residents

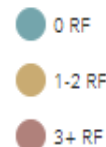
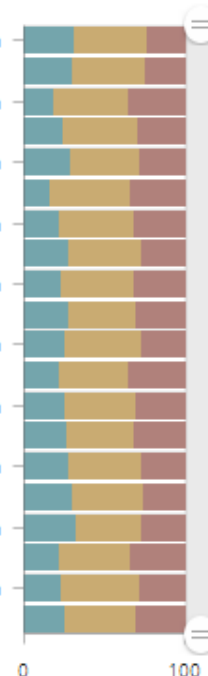
Number of Residents

County Comparison

Top 20 sorted by percentage of residents with 3+ RF

*click on a bar to see the location on the map, click again to turn off the selection

Autauga County, Alabama
Barbour County, Alabama
Blount County, Alabama
Butler County, Alabama
Chambers County, Alabama
Chilton County, Alabama
Clarke County, Alabama
Cleburne County, Alabama
Colbert County, Alabama
Coosa County, Alabama



County Comparison

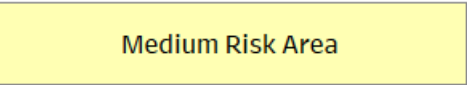
Tract Comparison

Is Your County Most at Risk?

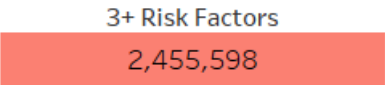
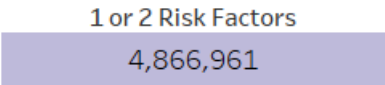
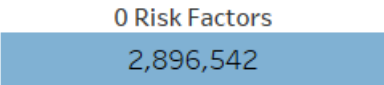
The Community Resilience Estimates (CRE) measure a community’s ability to endure, respond and recover from disasters and is a powerful tool to help identify the impact of COVID-19 and other disasters on the country’s most vulnerable populations and help emergency managers and communities plan for future health and weather disasters.

State of North Carolina Profile

Risk Assesment



Number of People in Each Risk Group



Equity Considerations for North Carolina

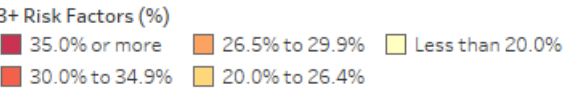
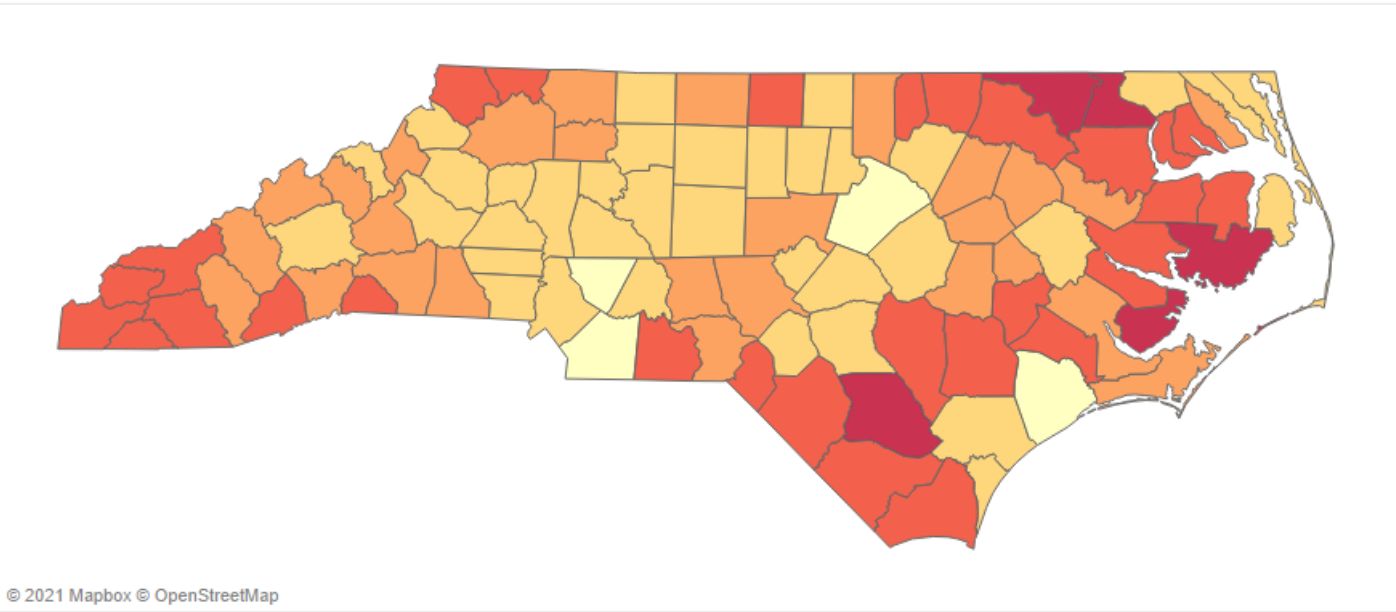
Hover for more information.

Rural Population (%)
33.9% (+/-0.0%)
Aged 65 and over
15.9% (+/-0.1%)
Below poverty
14.7% (+/-0.2%)
Median household income
\$54,602 (+/- \$231)
Unemployment rate
5.6% (+/-0.1%)
With a disability
13.4% (+/-0.1%)
Without health insurance
10.7% (+/-0.1%)
Broadband Internet subscription
80.7% (+/-0.2%)
Median age
38.7 (+/-0.2)

What are "Equity Considerations"?
Hover or click here for information.

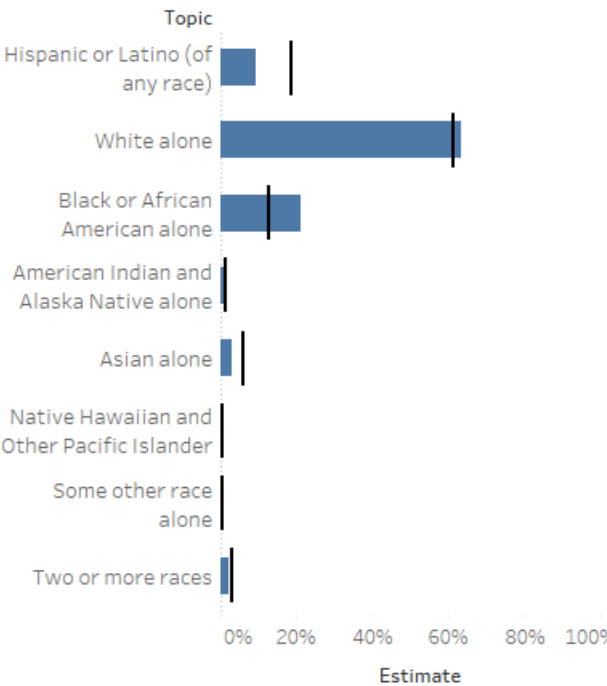
County Map of 3+ Risk Factors (%) in None

If the map is stuck, click the home button to reset the zoom.



Hispanic or Latino and Race Distribution of North Carolina

Black line represents U.S. estimate.



Return to national view

CSV File Download

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	geoid	state	county	tract	stname	stabrev	ctname	geo_level	popuni	prednum	prednum	predrt_0	predrt_0	prednum	prednum	predrt_12	predrt_12	prednum	prednum	predrt_3	predrt_3_moe	
2		1	1		Alabama	AL	State		4807130	1328762	65290.87	27.64	1.36	2192123	75799.27	45.6	1.58	1286245	66020.89	26.76	1.37	
3	1001	1	1		Alabama	AL	Autauga C County		55420	17545	4022.9	31.66	7.26	24796	4320.5	44.74	7.8	13079	3606.6	23.6	6.51	
4	1E+09	1	1	20100	Alabama	AL	Autauga C Tract		1921	495	170.7	25.77	8.89	902	188.6	46.95	9.82	524	163	27.28	8.49	
5	1E+09	1	1	20200	Alabama	AL	Autauga C Tract		2130	779	213.4	36.57	10.02	899	231.8	42.21	10.88	452	195.2	21.22	9.16	
6	1E+09	1	1	20300	Alabama	AL	Autauga C Tract		3467	1237	328.9	35.68	9.49	1454	343.8	41.94	9.92	776	280.4	22.38	8.09	
7	1E+09	1	1	20400	Alabama	AL	Autauga C Tract		4522	1632	407.8	36.09	9.02	1642	428.9	36.31	9.48	1248	374.9	27.6	8.29	
8	1E+09	1	1	20500	Alabama	AL	Autauga C Tract		10844	4023	1021	37.1	9.42	4722	1053	43.54	9.71	2099	822.1	19.36	7.58	
9	1E+09	1	1	20600	Alabama	AL	Autauga C Tract		3763	1061	334.2	28.2	8.88	1647	375.6	43.77	9.98	1055	329.7	28.04	8.76	
10	1E+09	1	1	20700	Alabama	AL	Autauga C Tract		2953	702	281.2	23.77	9.52	1442	293	48.83	9.92	809	235.3	27.4	7.97	
11	1E+09	1	1	20801	Alabama	AL	Autauga C Tract		3083	887	305.5	28.77	9.91	1318	335.3	42.75	10.88	878	288.3	28.48	9.35	
12	1E+09	1	1	20802	Alabama	AL	Autauga C Tract		10461	3335	953.9	31.88	9.12	5044	1047	48.22	10.01	2082	892.6	19.9	8.53	
13	1E+09	1	1	20900	Alabama	AL	Autauga C Tract		5697	1688	501.4	29.63	8.8	2871	550.9	50.39	9.67	1138	473.9	19.98	8.32	
14	1E+09	1	1	21000	Alabama	AL	Autauga C Tract		2960	787	269.3	26.59	9.1	1386	301.2	46.82	10.18	787	265.5	26.59	8.97	
15	1E+09	1	1	21100	Alabama	AL	Autauga C Tract		3619	919	295.1	25.39	8.15	1469	355	40.59	9.81	1231	332.1	34.01	9.18	
16	1003	1	3		Alabama	AL	Baldwin C County		216666	64652	12923.3	29.84	5.96	98449	14098.3	45.44	6.51	53565	12300.2	24.72	5.68	
17	1E+09	1	3	10100	Alabama	AL	Baldwin C Tract		4479	1146	398.8	25.59	8.9	2042	451.3	45.59	10.08	1291	409.2	28.82	9.14	
18	1E+09	1	3	10200	Alabama	AL	Baldwin C Tract		3433	1214	335.1	35.36	9.76	1424	369.4	41.48	10.76	795	321.1	23.16	9.35	
19	1E+09	1	3	10300	Alabama	AL	Baldwin C Tract		8772	3041	736.2	34.67	8.39	4046	822	46.12	9.37	1685	734.7	19.21	8.38	
20	1E+09	1	3	10400	Alabama	AL	Baldwin C Tract		5593	1577	490.2	28.2	8.76	2899	535.8	51.83	9.58	1117	461.3	19.97	8.25	
21	1E+09	1	3	10500	Alabama	AL	Baldwin C Tract		5205	1226	441.7	23.55	8.49	2566	500.4	49.3	9.61	1413	460.7	27.15	8.85	
22	1E+09	1	3	10600	Alabama	AL	Baldwin C Tract		3836	801	339.1	20.88	8.84	2027	397.5	52.84	10.36	1008	354.8	26.28	9.25	
23	1E+09	1	3	10701	Alabama	AL	Baldwin C Tract		9446	3117	791.5	33	8.38	4601	820	48.71	8.68	1728	677.7	18.29	7.17	
24	1E+09	1	3	10703	Alabama	AL	Baldwin C Tract		15518	5678	1275	36.59	8.22	7735	1300	49.85	8.38	2105	973.5	13.56	6.27	
25	1E+09	1	3	10704	Alabama	AL	Baldwin C Tract		6022	2137	568.1	35.49	9.43	2879	584.8	47.81	9.71	1006	460.6	16.71	7.65	
26	1E+09	1	3	10705	Alabama	AL	Baldwin C Tract		9918	3943	839	39.76	8.46	3782	868	38.13	8.75	2193	692.1	22.11	6.98	
27	1E+09	1	3	10800	Alabama	AL	Baldwin C Tract		8158	2572	711.8	31.53	8.73	3929	756.9	48.16	9.28	1657	663.4	20.31	8.13	
28	1E+09	1	3	10903	Alabama	AL	Baldwin C Tract		5495	1574	427.4	28.64	7.78	2626	472	47.79	8.59	1295	408.6	23.57	7.44	
29	1E+09	1	3	10904	Alabama	AL	Baldwin C Tract		8103	2189	702	27.01	8.66	3782	770.2	46.67	9.51	2132	671.3	26.31	8.28	
30	1E+09	1	3	10905	Alabama	AL	Baldwin C Tract		9452	3412	783.1	36.1	8.29	3938	861.4	41.66	9.11	2102	741.5	22.24	7.84	
31	1E+09	1	3	10906	Alabama	AL	Baldwin C Tract		5070	1525	412.1	30.08	8.13	2157	456.3	42.54	9	1388	406.1	27.38	8.01	
32	1E+09	1	3	11000	Alabama	AL	Baldwin C Tract		5144	1194	410.7	23.21	7.98	2373	461.4	46.13	8.97	1577	415	30.66	8.07	
33	1E+09	1	3	11101	Alabama	AL	Baldwin C Tract		10120	3129	830.2	30.92	8.2	3763	870.9	37.18	8.61	3228	751.1	31.9	7.42	
34	1E+09	1	3	11102	Alabama	AL	Baldwin C Tract		4400	1574	370.9	35.77	8.43	2025	407.4	46.02	9.26	801	353.9	18.2	8.04	
35	1E+09	1	3	11201	Alabama	AL	Baldwin C Tract		5191	1684	451.8	32.44	8.7	2030	521.9	39.11	10.05	1477	500	28.45	9.63	
36	1E+09	1	3	11202	Alabama	AL	Baldwin C Tract		6230	1708	540.3	27.42	8.67	2506	632.5	40.22	10.15	2016	600.6	32.36	9.64	

Reach out to our staff

- FEMA Mobile Vaccination Units
- Maryland Emergency Management Agency

Benefits of Using the CRE

- To identify most at-risk populations for equitable distribution of the resources, use the CRE.
 - The CRE is the timeliest, most statistically accurate, and granular measure of vulnerability.
 - Small area methodologies are proven.
 - The CRE advances the years of work on the SVI and SoVI.

Where do we go from here?

- Stakeholder Engagement
- Additional Iterations of the CRE
 - Hurricanes
 - Wildfires
 - Many other ideas
- Research

Thank you!

R. Chase Sawyer

Robert.C.Sawyer@census.gov

301-763-8688